

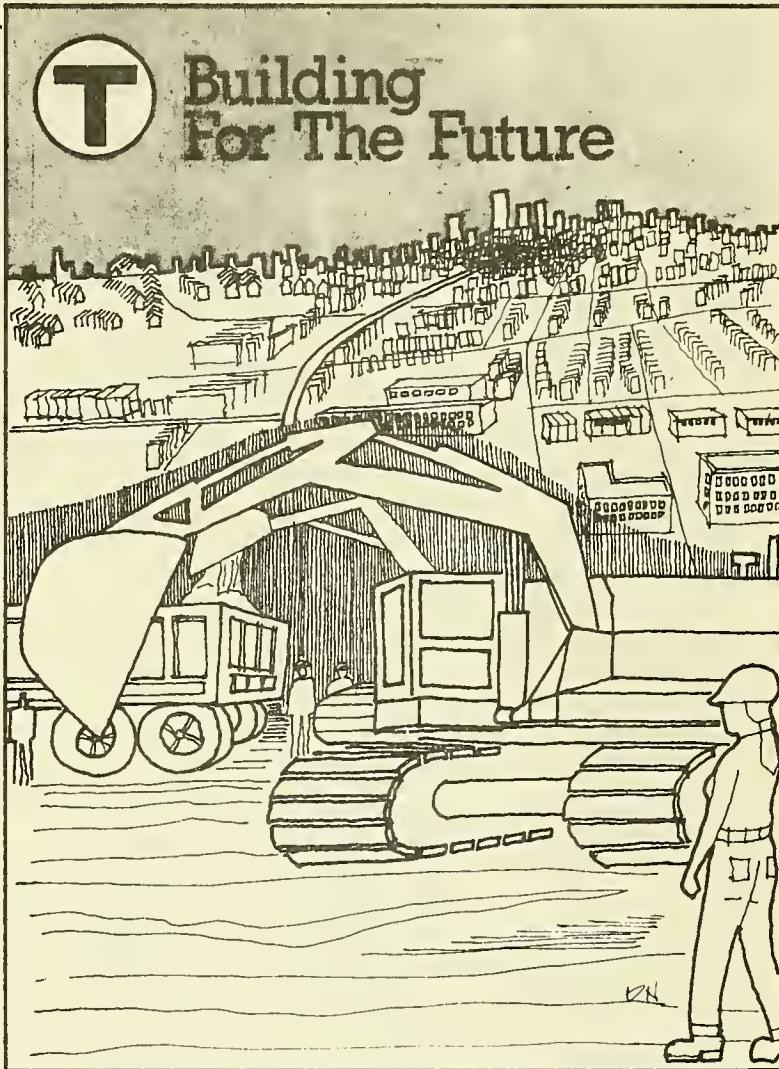
# Construction Story

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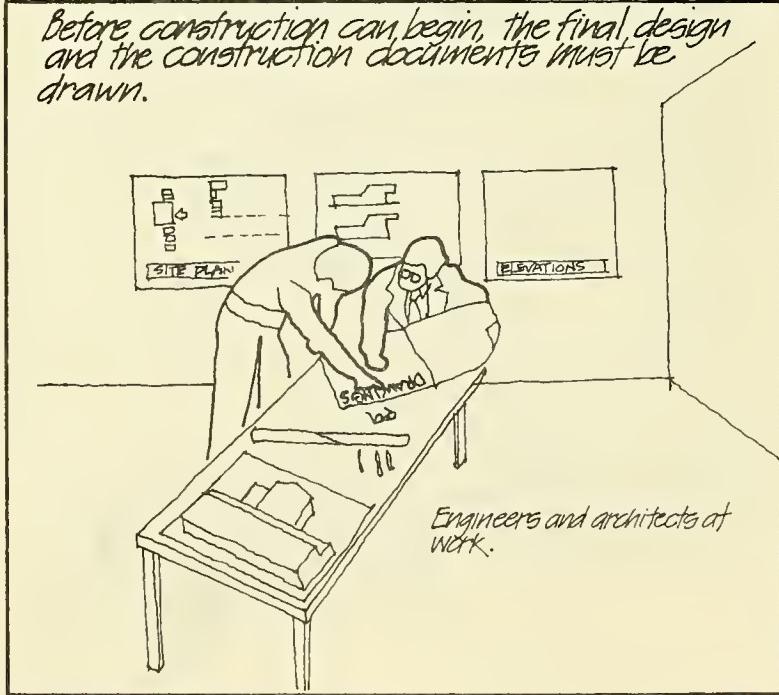
Construction of the Southwest Corridor Project will be complicated and will take place over several years. This "Construction Story" has been prepared to describe the construction process to Corridor residents, businessmen, and other interested persons. This story explains the basic steps that will occur in all three sections of the Corridor before and after Construction begins.

**WHAT HAPPENS BEFORE CONSTRUCTION BEGINS?** Before construction begins, final design and engineering work must be completed, and the construction work must be sent out for "bids" by contractors. The following steps will take place during 1979:

**FINAL DESIGN:** In the spring of 1979, the engineering, station architecture, and Parkland landscape architecture work entered the final design phase. During this phase almost all decisions on what will be built are to be made. By the end of final design, all of the contract documents will be completed. These documents include: working drawings (plans, elevations, sections, and details) which describe what will be built and where design elements will be located; specifications which describe the materials to be used and their installation; and general and special conditions that describe the other responsibilities of the contractors.



*Before construction can begin, the final design and the construction documents must be drawn.*



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Taken together these contract documents describe the final results to be produced during construction without spelling out the methods to be used in attaining those results.

Some provisions in the contract documents protect the owner, the MBTA, by specifying in detail what they expect to receive at the end of construction. Other provisions protect the community by stating what they can expect during construction. For example, the contract documents will establish criteria for work early in the morning and at night. Contractors bidding on the job will be required to follow these conditions set to protect the community.

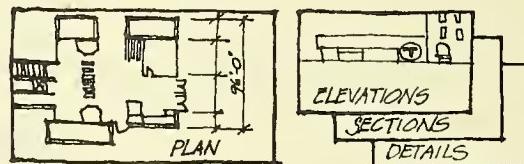
**REVIEW OF CONTRACT DOCUMENTS:** After the contract documents are completed by the architects and engineers, the documents must be reviewed and approved by the MBTA and the U.S. Department of Transportation (DOT) before public bidding begins.

**BIDDING:** Following advertising for bids, the MBTA will distribute sets of contract documents to interested construction contractors so that they can study the documents and prepare bids. The general contractors locate sub-contractors to do specific portions of the job. For example, they must find subs to do excavation and truck hauling, form-work and concrete work, and electrical sub-contracts.

## The Contract Documents include:

### 1 Working Drawings

Working drawings graphically illustrate the relationship of all parts of the transit system and how they work together. These drawings show how things are to be built.

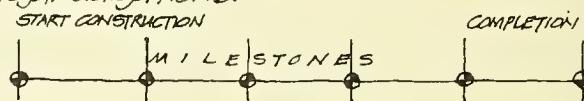


### 2 Specifications (technical sections)

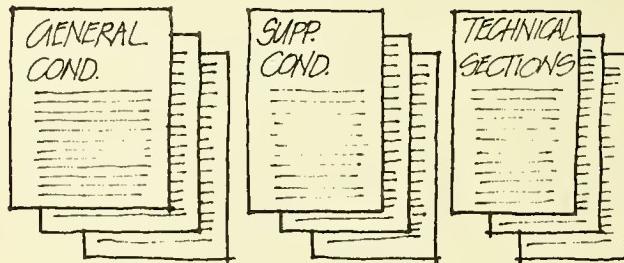
The specifications describe the type and quality of materials to be used; also the methods of installation and the testing procedures to be used in order to ensure the desired results.

### 3 Conditions of Contract

This portion of the contract document outlines the time frame and other legal obligations.



Also included are the supplementary conditions which are provisions that must be met to respond to special conditions.



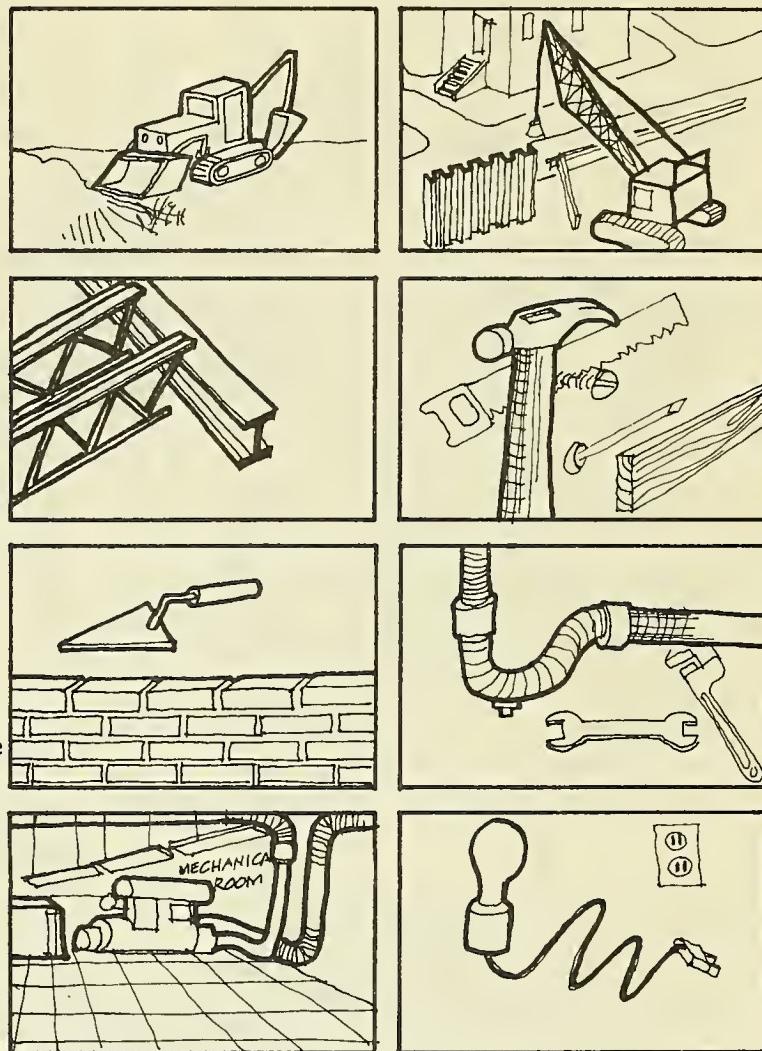
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The general and sub-contractors then estimate costs for labor, materials, items like equipment rental, and so forth. The contractors also consider how to meet local, state and federal regulations and figure that into their costs. The contractors include an amount for their profit and then submit what they hope will be the lowest bid.

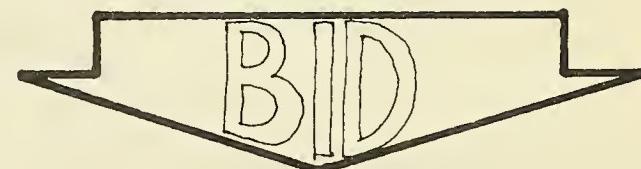
The general contractors select the methods of construction that they feel will attain the results called for in the contract documents at the lowest cost.

**REVIEW AND APPROVAL OF BIDS:**  
After bids have been submitted to the MBTA and after the bid opening, the bids are studied during the award period. The lowest qualified bid is then accepted by the MBTA Board of Directors. Because 80% of the project is paid for with Federal funds, DOT must also approve the award.

**AWARD:** The general contractors for each separate contract set up to begin work after they have been awarded the job. Each general contractor must prepare and submit a detailed construction schedule to the MBTA soon after the contract is awarded. Contractors may also be asked to describe some of their construction methods before work actually starts.



The General Contractor, along with the Sub contractor for each trade, must estimate their costs for labor, materials, equipment etc. This is the basis for the General Contractor's bid.



BID #1 Expenses	BID #2 Expenses	BID #3 Expenses
TOTAL \$\$\$\$	TOTAL \$\$\$\$	TOTAL \$\$\$\$

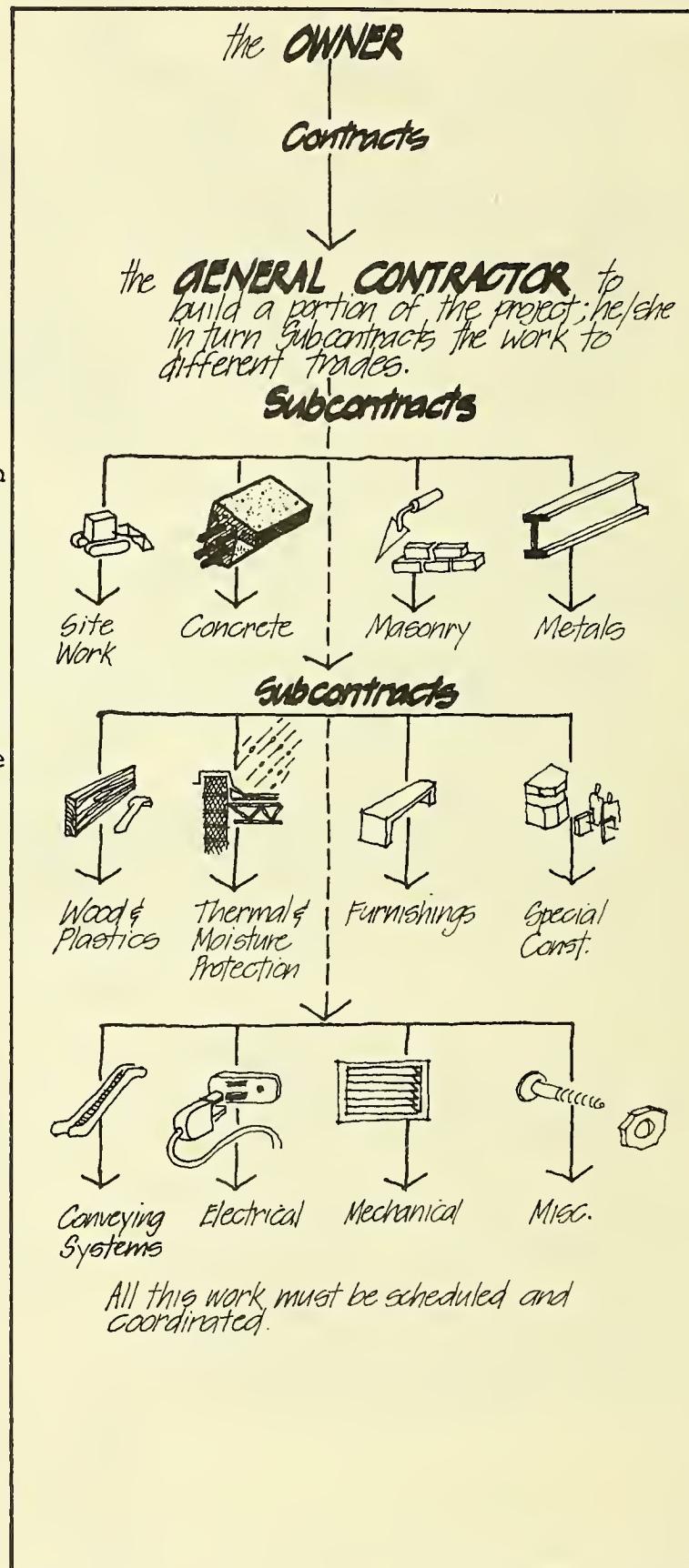
All bids are reviewed and approved by the MBTA Board.

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Work in each section of the Corridor will be done under separate contracts such as early excavation, line construction (including structural work, landscaping, and laying tracks), and station construction.

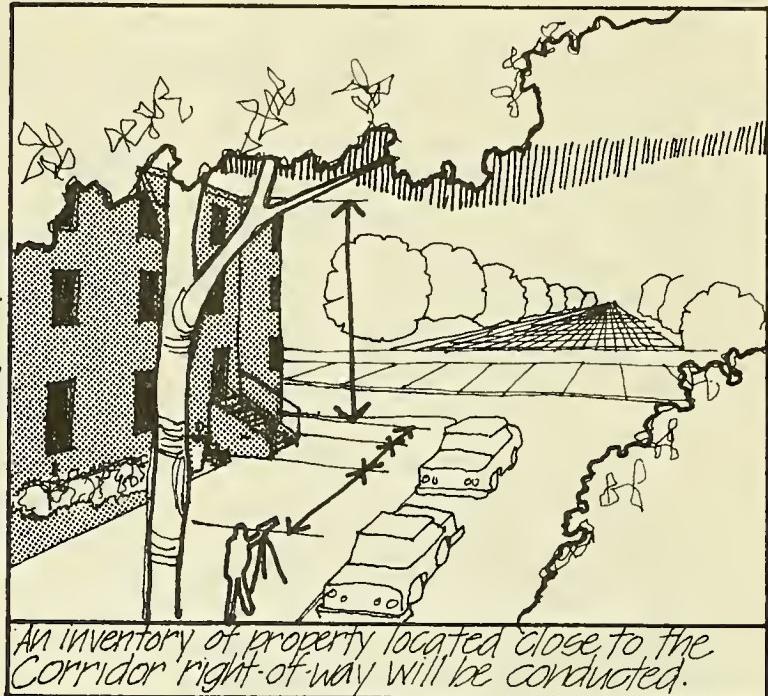
Even though the results to be obtained after construction are specified by the contract documents, many decisions about how construction will be done are made by the contractors during construction. Certain decisions are subject to approval by the MBTA, but decisions such as the choice of equipment used by the contractor are up to the contractors themselves. Different contractors at work on the project may make different choices, so not all similar work will be done in the same way.

Because of existing conditions of surrounding buildings, the present embankment, underground water, and so forth, each section of the Corridor will be built somewhat differently. The following steps, however will take place in all sections:



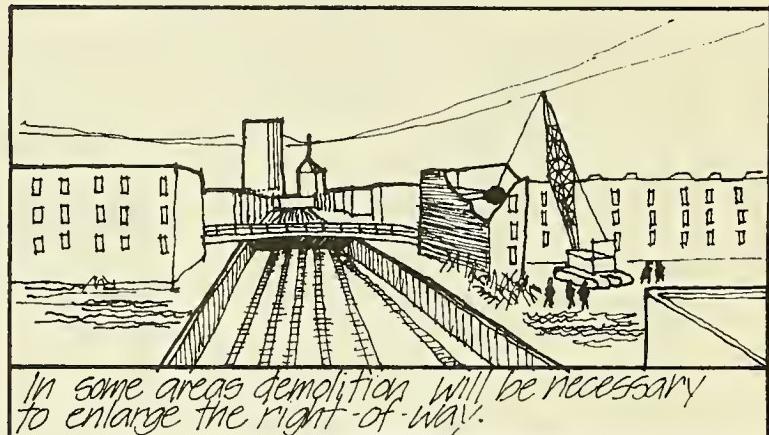
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**PRE-CONSTRUCTION SURVEY:**  
An inventory of property located close to the Corridor right-of-way will be conducted by the MBTA and contractors before construction work begins. Notes and photographs will establish the existing conditions to protect everyone's interests.



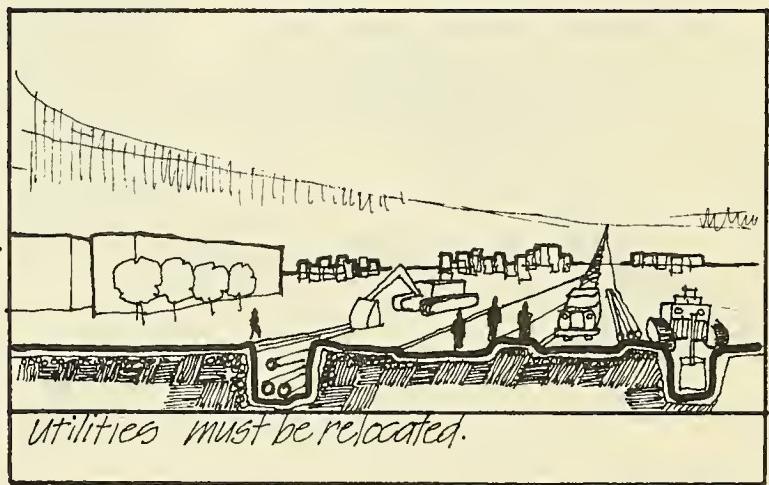
*An inventory of property located close to the Corridor right-of-way will be conducted.*

**DEMOLITION:** In some areas of the corridor, a small amount of additional demolition of structures is necessary to enlarge the right-of-way before construction can take place. When presently occupied buildings are to be demolished, that work will begin soon after the buildings occupants have been relocated to another location.



*In some areas demolition will be necessary to enlarge the right-of-way.*

**UTILITY RELOCATION:** Because new bridges are to be built crossing the corridor and because excavation will cross some existing water, sewer, power and telephone lines, some utilities must be relocated to other places. There should be minimal disruption of present service, and notification will be given if any service must be temporarily shut off.



*Utilities must be relocated.*

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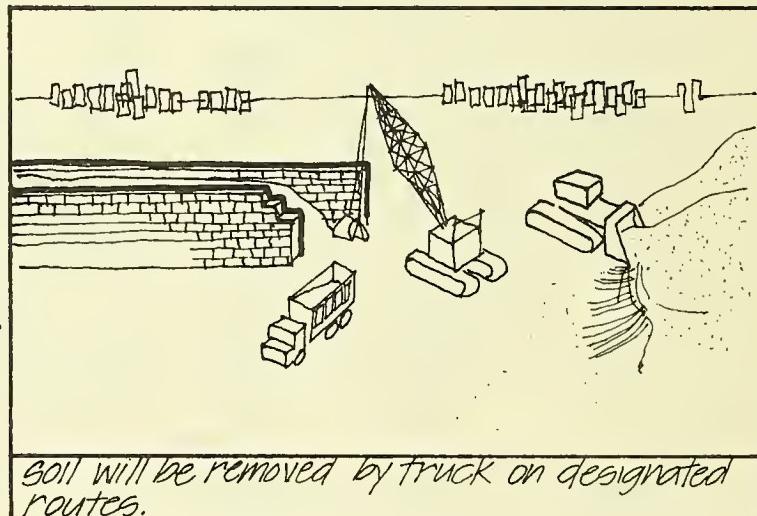
**DETOURS:** At various times while construction is in progress, some streets and bridges will be closed to traffic. Detours will re-route traffic on existing city streets and on special roads in some cases. The recommended detour routes have been carefully studied to minimize disruption to residential neighborhoods and to ensure as smooth a flow of traffic as possible. In most cases, no two adjacent bridges will be closed at once so detour traffic will not be concentrated.

**EXCAVATION:** The first major step of line construction will be excavation of the existing embankment.

**SPOIL REMOVAL:** Earth removed from excavations are known as "spoil". Spoil will be removed by truck to several sites that need fill in the Greater Boston area. Trucks will use the Corridor right-of-way whenever possible, and then major streets and highways to reach the areas to be filled. Excavation below the ground water level will require special techniques to keep the work site dry while maintaining current water levels below property located outside the right-of-way.



*Detour routes have been carefully studied to minimize disruptions to neighborhoods.*



*Soil will be removed by truck on designated routes.*

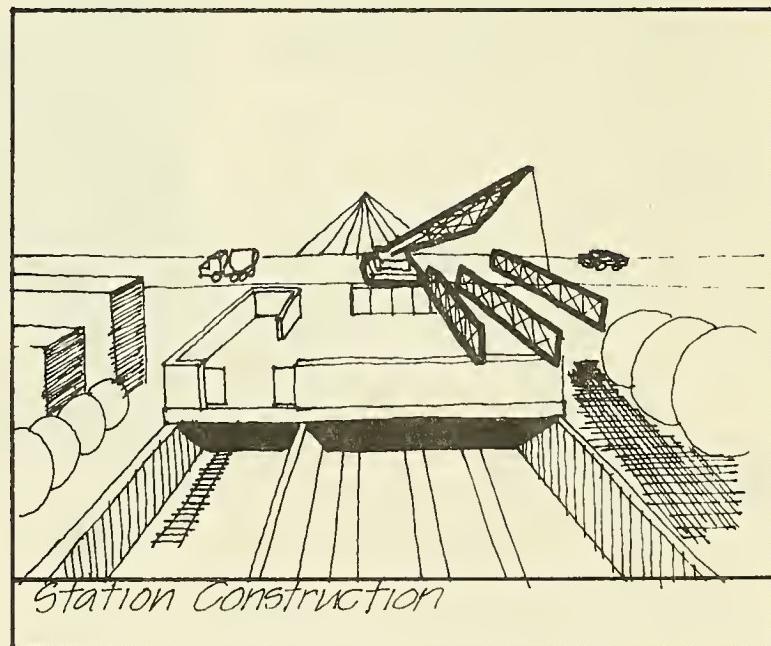
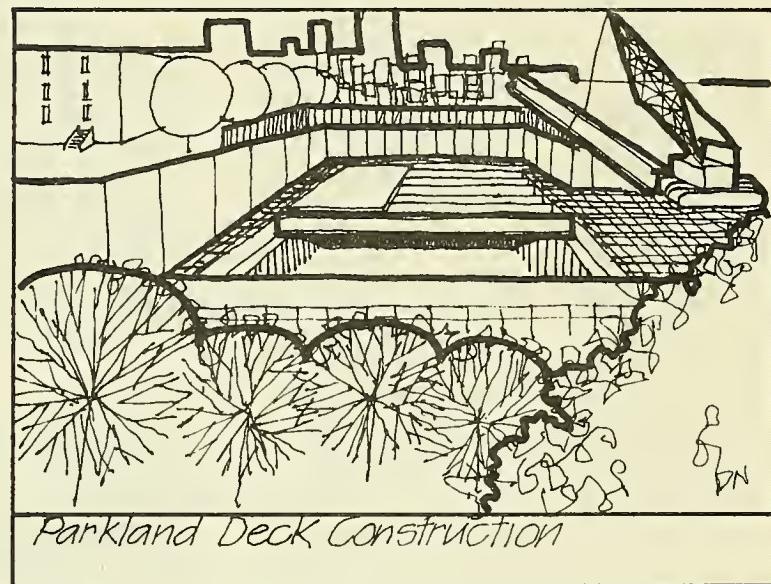
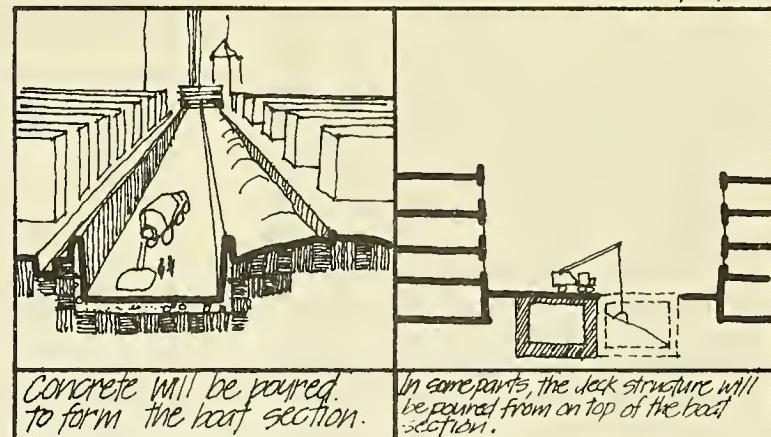
**BOAT SECTION CONSTRUCTION:** The bottom slab and side walls of the transit and railroad trench are designed to keep out ground water and to support the trackbed and structures above. Concrete will be poured to form the boat section, and earth will be backfilled around the completed structure. In some parts of the Corridor, deck structures will be poured on top of the boat sections to enclose the transit and railroad.

**BRIDGE CONSTRUCTION:** New street bridges will be built while work continues on the line structure below.

**STATION CONSTRUCTION:** Work on each station can begin after the boat section beneath the station sites have been completed. The platform area and the headhouse, which contains the station lobby, will be constructed using techniques similar to conventional building construction.

**LANDSCAPING:** As deck structures and land adjacent to the right-of-way become available, landscape work can begin. The general contractors will coordinate this work with other construction so that new planting and paving are protected during the later stages of construction.

**TRANSIT AND RAIL INSTALLATION:** The last phases of construction will involve the installation of the tracks, third rail, signals and communication system, and lighting.

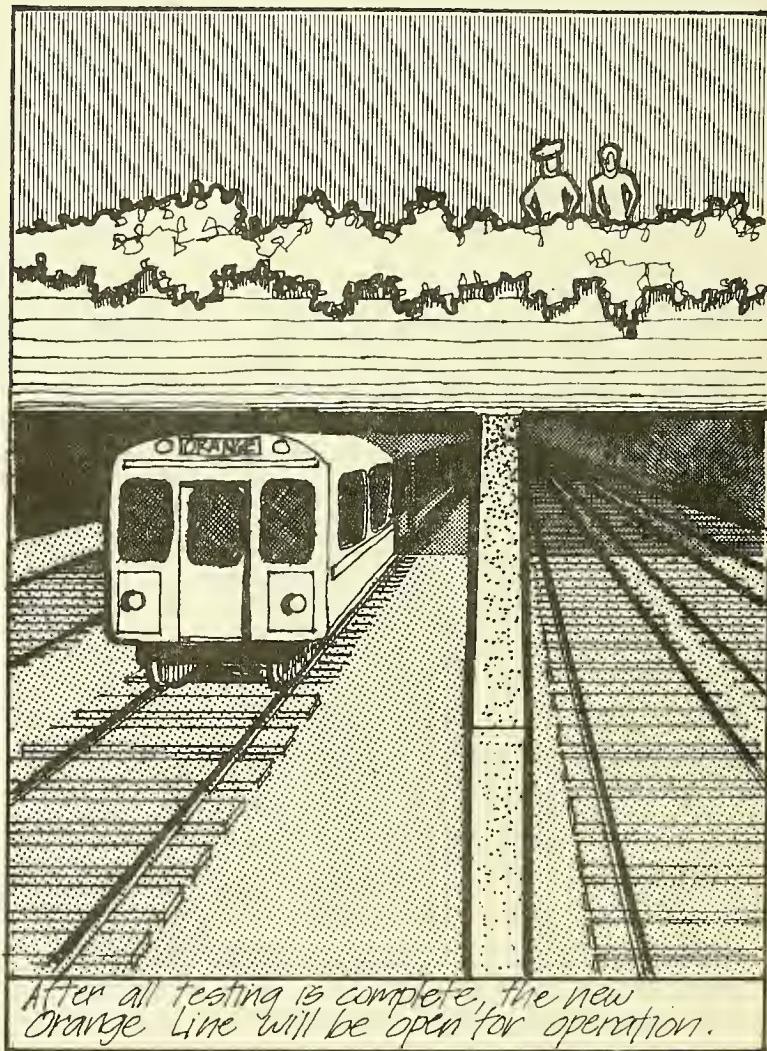
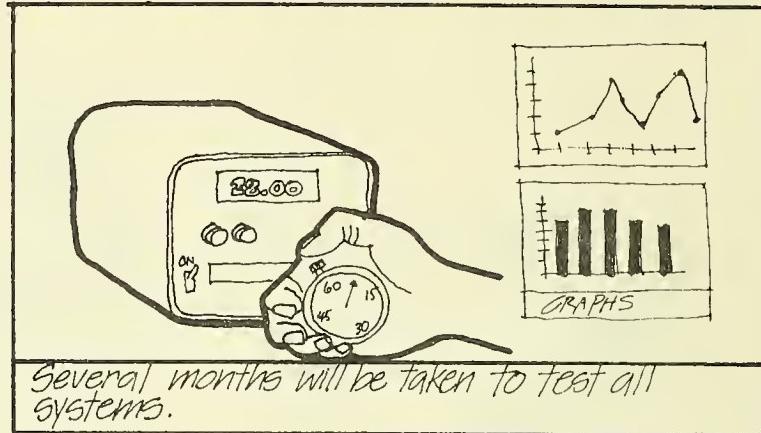


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TESTING: Several months will be taken to test all the systems of the new Orange Line and railroad line to ensure their safe and reliable operations. Trains will be run on the tracks, and the performance of systems will be carefully tested before the work is finally accepted by the MBTA.

CONSTRUCTION INSPECTION: Throughout the construction process, the MBTA construction department will be responsible for field inspection. That means that the MBTA will check to see that the contractors meet the requirements of the contract documents. The MBTA will also approve minor changes as necessary.

The general contractors are responsible for completing the work according to the contract documents and will be responsible for rectifying any damage that might result from their work. Critical locations will be monitored for signs of damage during construction.

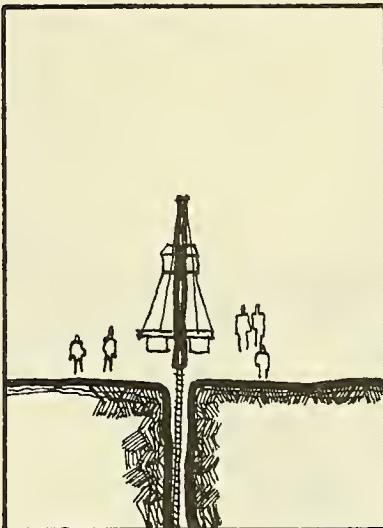


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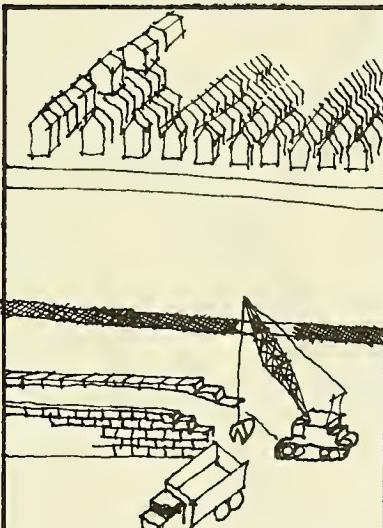
# A. PROCESS: Steps of Construction

## 1. PREPARATORY WORK

\*Boring: drilling to study the sub-soils for construction.



## 2. ADVANCED EXCAVATION



## 3. RELOCATION OF UTILITIES AND CONSTRUCTION OF SAFETY FENCE



Even prior to the beginning of construction there has been work along the Corridor site. The surveyors have measured and recorded existing conditions which the Section Engineers, HNTB, have transferred to base drawings. Boring\* crews have used their drilling rigs to provide information about soil conditions which aids in the design of the depressed section, station foundations, bridges, decks, etc.

The first construction work in Section III will be done under an "advance excavation contract," that is, in advance of the general line contract. This work will consist of removing the existing railroad embankment down to about original ground level. Much of the material will be shipped out, but some of the granite block and some of the better fill material will be stockpiled for future use.

Work during the first part of the major line contracts will be the relocation of utilities such as electricity, gas, water, sewers, and telephone. The construction, for the most part taking place on existing city streets, will be coordinated with the private utilities and their subcontractors. There will be no disruption of essential services. A safety fence will be used to enclose the construction site.

# A. PROCESS: Steps of Construction

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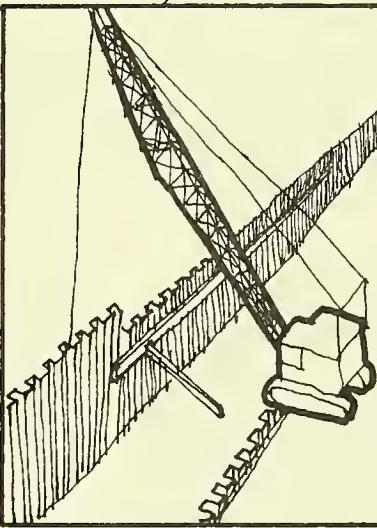
## 4. DETOURS



In Jamaica Plain detours will be built sequentially as required in order to minimize disruptions to traffic flow and allow movement of emergency vehicles. Particular cases, such as school children crossing the Corridor will have specific solutions which enable pedestrian movement to be maintained during construction.

## 5. PLACE SHEET PILING

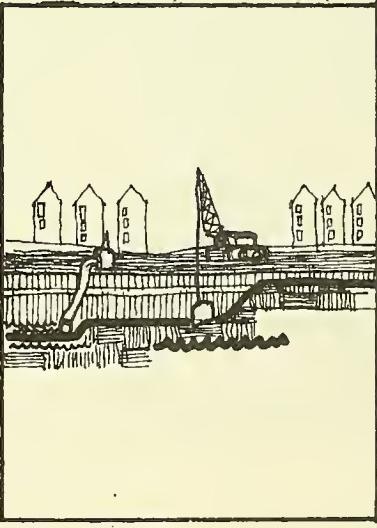
\*Sheet piles: steel sheets placed in the ground to form temporary construction walls.



Existing groundwater levels need to be maintained in order to prevent settlement of buildings. The contractor will place sheet piling\* along the perimeter of any area to be excavated below the water table prior to starting excavation. This will isolate the construction area from the adjacent buildings and prevent the drawdown of groundwater outside of the immediate construction site.

## 6. EXCAVATION

\*Groundwater: water below the surface located in the spaces between soil particles.



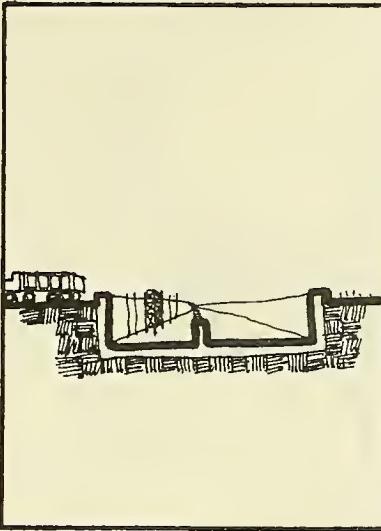
The next phase of excavation will be below the ground level and into the groundwater\*, which will be controlled by sheet piling or by carefully graded slopes and pumps.

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## A. PROCESS: Steps of Construction

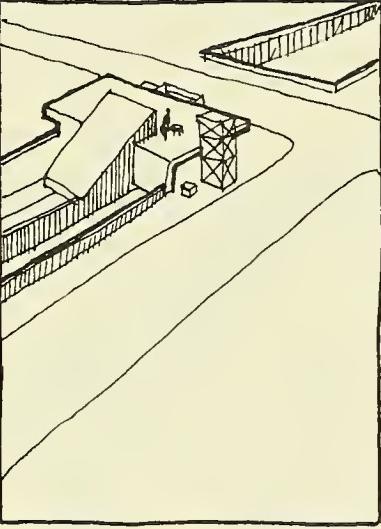
### 7. CONSTRUCTION OF THE DEPRESSED SECTION

\*Boat Section: a reinforced concrete waterproof box containing the rail bed.



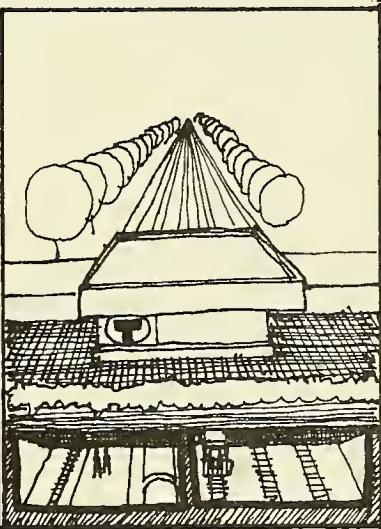
Actual construction of the depressed boat section\* will include the laying of track drainage, slab and wall formwork, reinforcing, installing conduits, and the pouring of concrete. At locations where there are bridges or decks there will be additional concrete work. Following appropriate curing of the concrete, the rough grading of the Parkland will begin.

### 8. STATION CONSTRUCTION



Work on the three stations can proceed following completion of the boat section walls which form the foundations for the stations. Construction of the Forest Hills Station will be broken down into phases. Detours, as well as construction sequences, need to function in such a way that automobiles, buses, and the existing Orange Line can operate without interruption during construction.

### 9. TRANSIT AND RAIL INSTALLATION, TESTING, AND LANDSCAPING

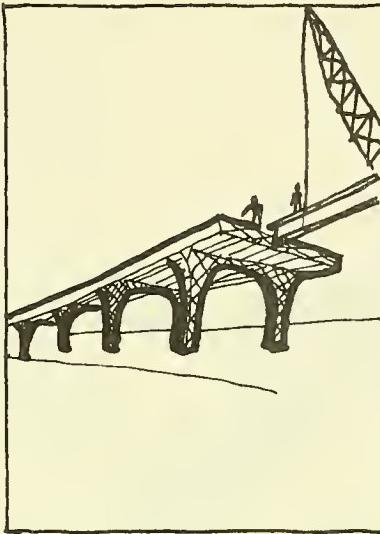


Later phases of construction will involve the installation of the tracks, third rail, and signals and communications system. Concurrent with the testing of the new systems, including train operations, final landscaping of the Parkland will proceed.

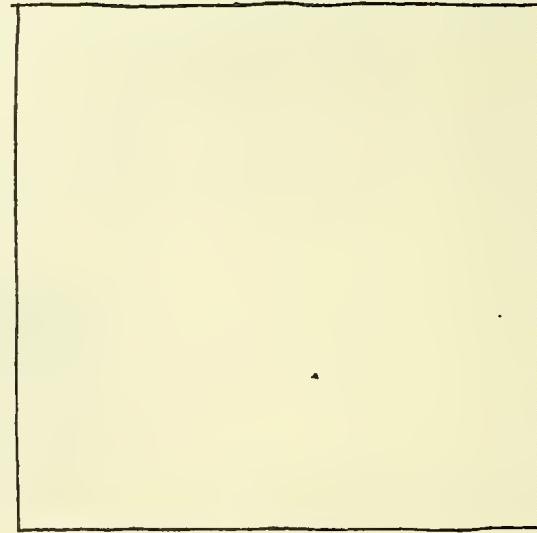
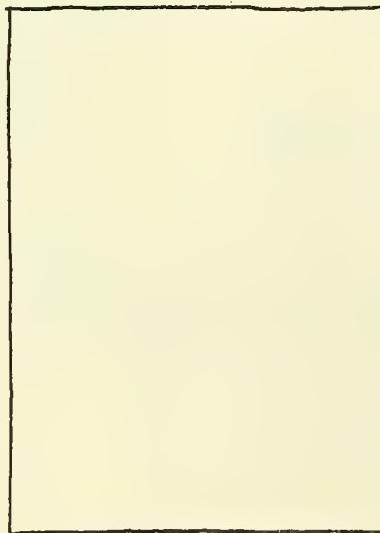
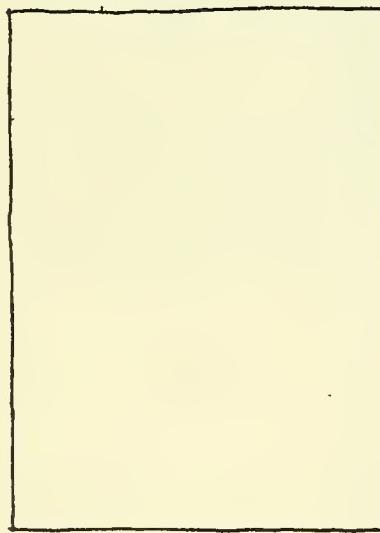
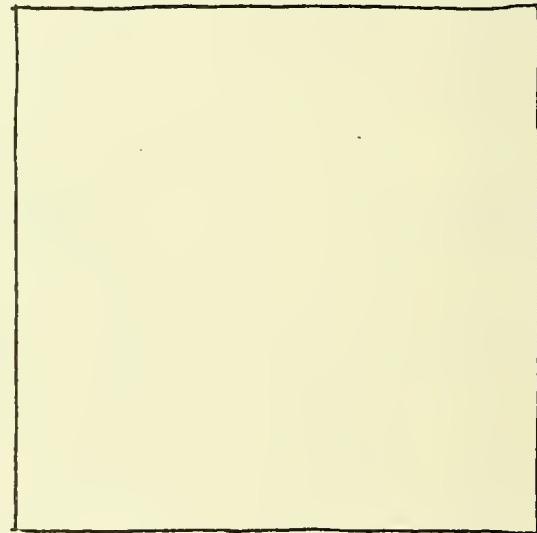
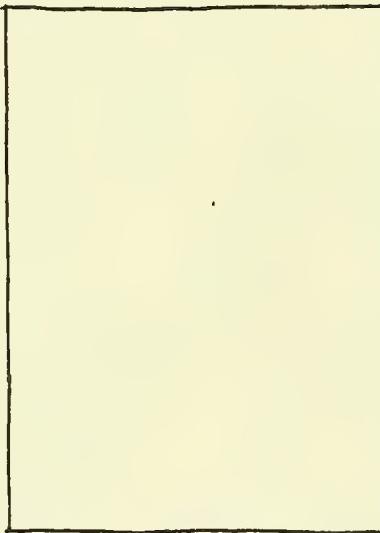
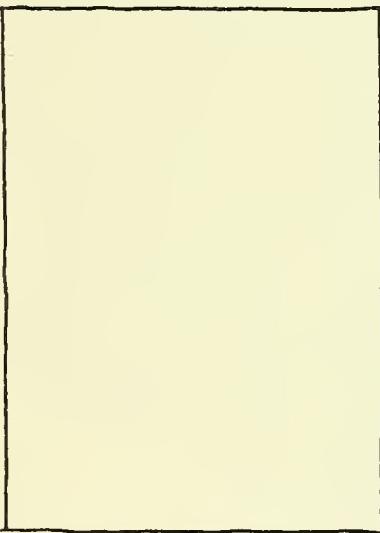
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## A. PROCESS: Steps of Construction

10. COMPLETION OF FOREST HILLS STATION



After the Orange Line in the Southwest Corridor becomes operational, the existing Orange Line El along Washington Street will be removed. Finally, the portions of the new Forest Hills Station on the site of the old station will be completed.

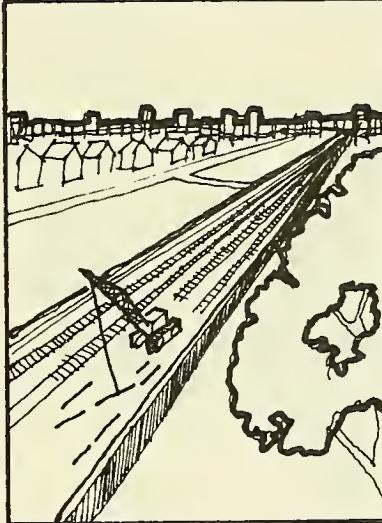


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## A. PROCESS: Advanced Contracts

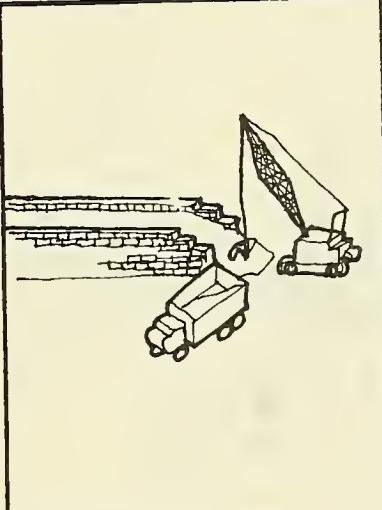
In Section III there are several construction tasks which are scheduled to begin during 1979. These "advanced contracts" will be completed before the major civil and structural engineering work begins on the "line contract" in mid 1980. The following paragraphs describe the tasks included in this advanced work.

## TRACK REMOVAL



In late summer, removal of tracks on the present embankment will begin. Space provided on the embankment will be used for a truck haul road.

## REMOVAL OF GRANITE BLOCKS AND GRAVEL FILL

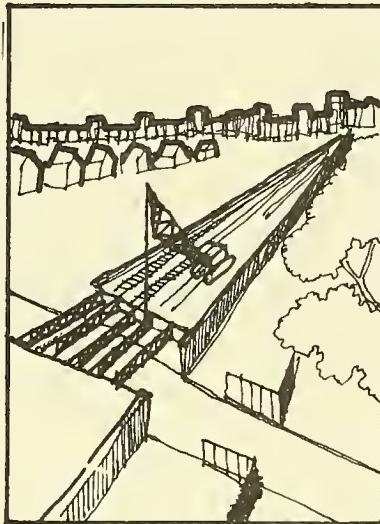


Next, granite blocks will start to be removed from the embankment structure. Some blocks will be stored nearby for future use on the project. The rest of the blocks will be removed from the site. Some of the gravel fill from the embankment which cannot be reused on the project will be removed by truck.

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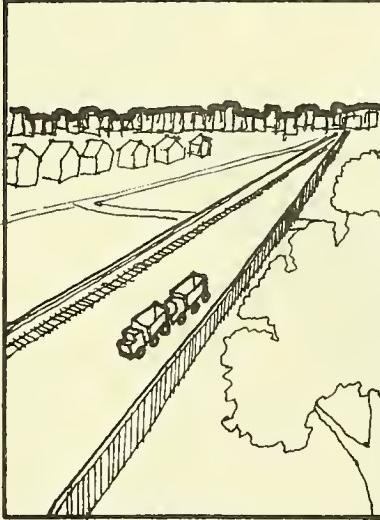
## A. PROCESS: Advanced Contracts

### REMOVAL OF EXISTING RAILROAD BRIDGES



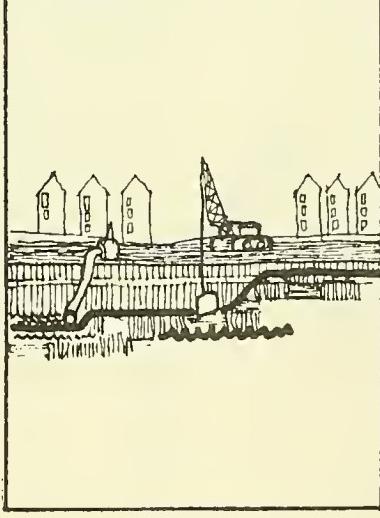
The existing bridges on the embankment will be removed in a sequence, for example, the contractor may work from north to south. Each street will be closed briefly and the bridge structure will be removed.

### SPOIL REMOVAL



The removal of fill, or "spoil," from the embankment will continue in a sequence in Section III with some spoil removed to the north and some to the south. A portion of the embankment near Minton Street will remain in place temporarily during the advanced excavation contract. Fill from that area will be used later during construction in Section III.

### LINE CONTRACT BEGINS



By the middle of next year work can begin on the "line construction contract." In that work will be excavation below the nearby ground level, construction of the boat section for the tracks, the station structures and the Parkland.

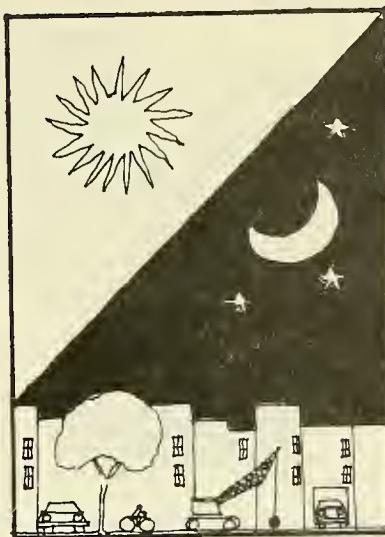
## B. KEY CONCERNS

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## CONCERN

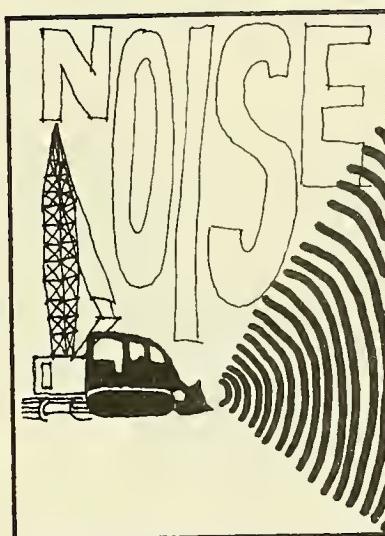
## RESPONSE

WORK HOURS AND NOISE CONTROL determine how much work is done each day in the project area.



Work will be controlled by regulations for the control of noise levels in the construction area. There will be "daytime" and "all other time" restrictions to noise levels for 6 days out of the week excluding Sundays. Daytime shall mean the period between the hours of 7:00 AM and 10:00 PM.

NOISE is made at every construction job, but noise can be controlled and its effects can be reduced.



Noise restrictions will be written into the project specifications. These restrictions will limit equipment noise levels during certain hours of construction. Testing of equipment and of compliance will be the responsibility of the contractor.

PROTECTION OF ABUTTING PROPERTY DURING CONSTRUCTION is important to residents who live close to the right-of-way, particularly in Section I.



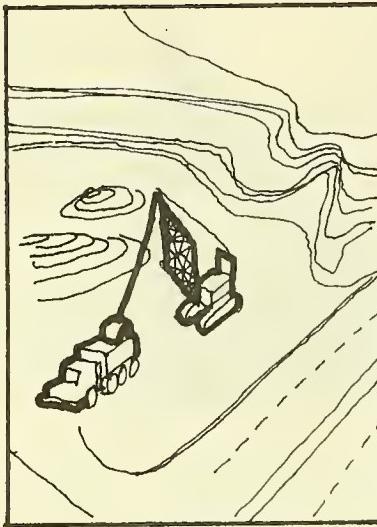
The design of the right-of-way has taken existing adjacent structures into account. An inspection and documentation of structures will also be made with the owners before construction to determine existing conditions.

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## B. KEY CONCERNS

### CONCERN

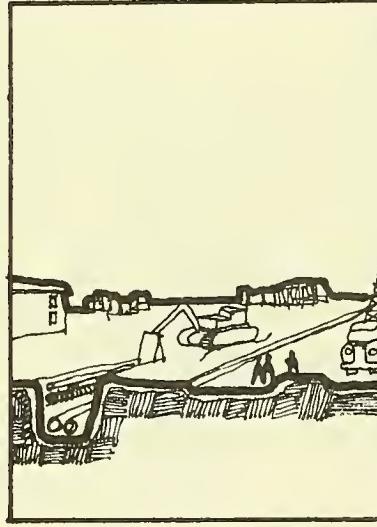
SPOILS REMOVAL  
is the transportation of excavated materials ("spoil") away from the Corridor to be used for fill elsewhere.



### RESPONSE

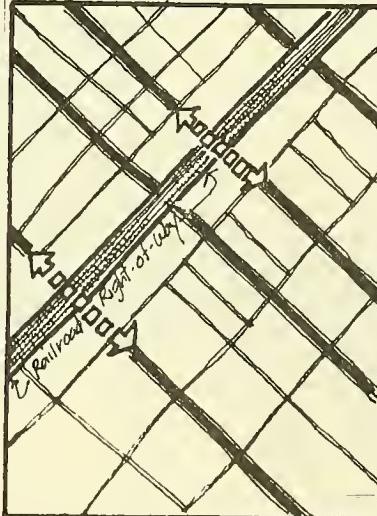
Spoil will be moved within the right-of-way by truck. The possibility of spoils removal to a point outside of the right-of-way using railroad cars is under consideration; trucks will carry spoils away from the Corridor on major streets.

UTILITY RELOCATION  
must be completed before some of the construction work can begin.



Utility service will not be significantly disrupted. Residents and businesses will be given temporary service if interruptions by the contractor and/or utility company is required. Initial utility relocations will be starting June - July 1979 by the utility companies.

SEQUENCE OF BRIDGE RECONSTRUCTION  
affects traffic circulation during construction. All crossings of the right-of-way need to be reconstructed.



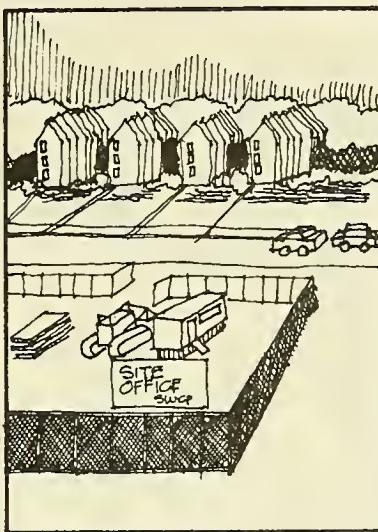
The contractors will be restricted to closing only certain bridges at each step of construction. This means that many of the present crossings will remain open at any time. Several crossings such as Centre Street will have detour roads across the right-of-way.

## B. KEY CONCERNS

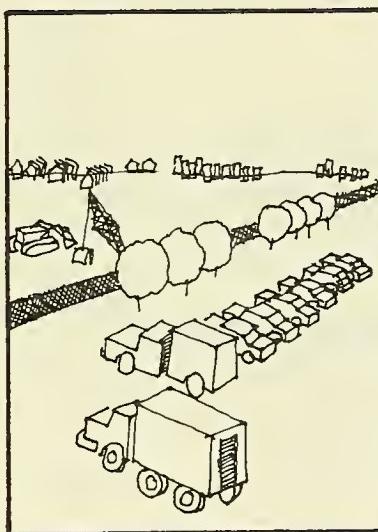
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**CONCERN**

STAGING AREAS  
are sites near the construction where materials and equipment are stored, and where the contractors will have site offices.

**RESPONSE**

Staging areas in Sections II and III will be on cleared land near the right-of-way. In Section I areas at each end of the right-of-way will be used. The areas will be fenced and protected by the contractors.

**PARKING FOR CONSTRUCTION WORKERS**  
can use up spaces on local streets.

Contractors will be asked to designate parking. Workers must follow Boston regulations for on-street parking. Construction workers arriving at 6:30 AM will probably not displace residential parkers although commuters may be displaced.

**INFORMATION DURING CONSTRUCTION**  
should come from one source that people can contact to ask specific questions and to report problems related to construction.

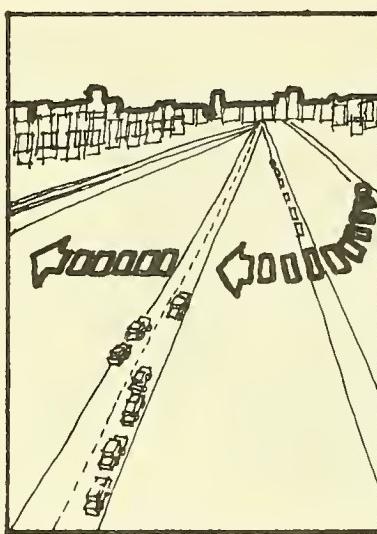
The MBTA will establish a "construction line" during construction of the Corridor which people can call for up-to-date information and to report problems related to construction.

## B. KEY CONCERNS

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### CONCERN

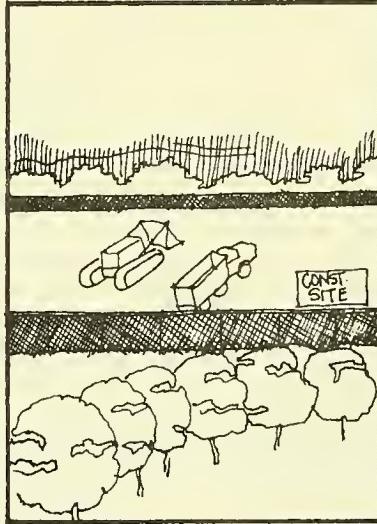
**DETOURS**  
are the routes that cars and trucks take to get to the bridge crossings.



### RESPONSE

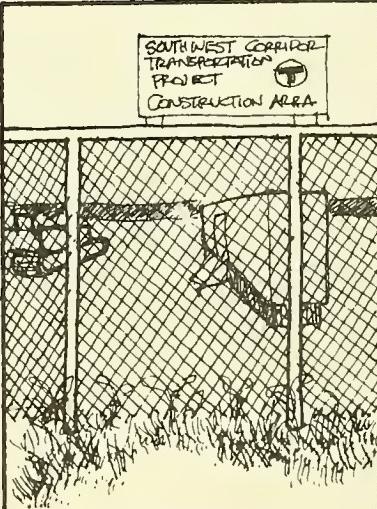
The engineers have laid out detour routes to maintain the flow of traffic through the construction area to minimize traffic tie-ups, and to reduce disruption to residential areas. Detours are planned to keep traffic off local streets. Detours must be approved by the city.

**SITE SECURITY**  
is important to the contractors who want to protect their investment and to have a safe job site, and to residents who are concerned about their personal safety.



Security of the site and equipment is required and is the responsibility of the contractors. Methods of fencing, special lighting, and other methods of security will be chosen by them. Security in areas adjacent to the site is the responsibility of the local police.

**CONSTRUCTION FENCING**  
is required.



The construction site will be fenced by the contractors.

5/7/79

## B. KEY CONCERNS: Work Hours and Noise

WORK HOURS: Work can take place in two shifts, between the hours of 7 AM and 3:30 PM and between 3:30 PM and 11 PM. Project specifications and the Boston Noise Ordinance limits nighttime noise to prescribed levels.

NOISE: Noise restrictions are written into the project specifications that limit equipment noise levels. Certification of compliance will be the responsibility of the contractor. Specific noise abatement measures are also listed for the contractors.

The standards for the control of noise generated by construction are being developed by the coordinating engineers and will comply with local, state, and federal regulations. The purpose of the specifications is to minimize the construction noise effects in the community surrounding each construction site and staging area.

Heavy construction equipment will be used primarily during the daytime hours of 7 AM to 3:30 PM. At a construction site near a residential or institutional property, the maximum allowable noise level will be 86 dBA. An exception to this rule is the use of impact pile drivers which are restricted to the hours between 8 AM and 5 PM weekdays because the noise level generated by this equipment exceeds 86 dBA.

Noise abatement measures that will be used by the contractors are:

- 1) Shields, impervious fences, or other physical sound barriers to inhibit transmission of noise;
- 2) Sound retardant housings or enclosures around noise producing equipment;
- 3) Effective intake and exhaust mufflers on internal combustion engines and compressors;
- 4) Location of stationary equipment so as to minimize noise impact on the community;
- 5) Maintenance of all equipment such that parts of vehicles and loads are secure against rattlings and banging.

Similar specifications were used by the MBTA on other construction projects.

